transliterations and without notes or explanations, they at least supplied the beginner with a good collection of material to work on, though he was still not in a position to walk alone. At the instance of several friends who made use of the book, Dr. Budge has now republished these compositions, breaking the lines up into words, and adding a transliteration at the foot of the page; he has also compiled a complete vocabulary to the texts, giving a number of references to each word, so that it is possible to compare their use in several passages. The student is thus enabled to acquire, without additional help, a knowledge of the language and of the principal literary compositions of ancient Egypt.

The twenty complete texts, which the volume contains, extend over a period from about B.C. 3500 to B.C. 250, and are good specimens of the various forms of composition which occur in Egyptian literature. They comprise fine examples of the biographical texts of the sixth and twelfth dynasties, of the historical inscriptions of the eighteenth and nineteenth dynasties, and of the compositions of the twenty-fourth dynasty, and of the Ptolemaic period, besides religious, moral and funereal texts of various dates. Perhaps the most attractive to the student of folk-lore, however, would be the two pieces with which the book begins—"The tale of the two brothers" and "The possessed Princess of Bekhten." Of these, the former is well known from its striking resemblance in many particulars to the tale of Joseph in Hebrew literature. The latter, however, is not so well known, and may be briefly summarised, as it throws an interesting light on the exceedingly anthropomorphic conception which the ancient Egyptian formed of his gods.

The story runs that the King of Egypt, while receiving homage in Mesopotamia from the neighbouring countries, had seen a beautiful girl, the daughter of the Prince of Bekhten, whom he married and took back with him to Egypt, giving her the title Rā-neferu. Shortly afterwards a messenger came from Bekhten with the news that Ra-neferu's younger sister was sick, and praying that a physician might come and see her. A physician was sent, but he could do no good, as he found the lady was possessed by a devil; so the Prince of Bekhten asked the king to send him a god to cure his daughter. The god Khonsu was accordingly brought with much pomp from Thebes, and arrived at Bekhten after travelling one year and five months. The demon, on beholding Khonsu, at once stated his readiness to go, but asked the god's permission that a feast should first be held to celebrate his departure. The story continues with the following quaint description of the feast of the god and the demon:—

> "And the god Khonsu graciously granted this request, and spake to his priest, saying, 'Let the Prince of Bekhten make a great festival in honour of the demon.' Now, while the god Khonsu, who performeth mighty things and wonderful in Thebes, was arranging these things with the demon, the Prince of Bekhten and his army stood by in exceedingly great fear. And the Prince of Bekhten made a great festival in honour of Khonsu, who performeth mighty things and wonderful in Thebes, and they passed a happy day together; and by the command of Khonsu, who performeth mighty things and wonderful in Thebes, that demon departed in peace unto the place which he loved."

The Prince of Bekhten was so delighted that he determined to keep Khonsu in his own country, and he did so for three years, and was only induced to take him back when the god proved to him that his power had departed by appearing to him in a dream as a golden hawk, which came forth from his shrine and flew back to Egypt. This story is a good specimen of Egyptian folk-lore, and illustrates the fact that whatever abstract conceptions of a central and supreme divinity the Egyptian may have entertained, his local gods were extremely human, and endowed with very limited powers.

But if Egyptologists have not been idle in their endeavours to forward the study of the language and literature of the country, private individuals have no less been doing their share by rendering their collections of Egyptian antiquities available for students. In the years 1882 and 1885-6, Lady Meux formed a fine collection of Egyptian antiquities, containing a number of very important objects, which is perhaps, among private collections, second only to that in the possession of the Duke of Northumberland. What the late Dr. Birch did sixteen years ago for the latter collection in his "Catalogue of the Egyptian Antiquities at Alnwick Castle," Dr. Budge has now performed for Lady Meux's collection, in the work the title of which is quoted at the beginning of this review. This catalogue is privately printed, but we understand it has been distributed among scholars and the principal libraries in England and on the continent, so that the contents of the collection are now available for general study. Dr. Budge has made his catalogue as full as possible, translating and giving in full the texts which are painted or inscribed on the more important coffins, stelæ and figures in the collection; while the numerous photographic plates throughout the volume give an excellent idea of the general appearance of the larger objects. The book itself is sumptuously printed and bound, and, dealing as it does with so important a collection, will prove of the greatest value not only to the collector and the antiquary, but to all those who are interested in ethnographical studies, and who concern themselves with the history and remains of ancient religion and ritual.

THE HISTORY OF ELEMENTARY MATHEMATICS.

A History of Elementary Mathematics; with Hints on Methods of Teaching. By Florian Cajori, Ph.D. Pp. viii + 304. (New York: The Macmillan Company. London: Macmillan and Co., Ltd., 1896.)

THIS unpretentious but trustworthy book deserves a cordial welcome, and is likely to serve a very useful purpose. There is sound sense in the author's conviction that teachers of elementary mathematics may profit greatly by a knowledge of the history of the subject. They are able to arouse the interest of their pupils, in a way which would otherwise be impossible, by telling them something of the course of mathematical discovery, and of the lives of those who have made the science what it is to-day. Even a schoolboy ought to know that Euclid is the name of a man and not that of a book; and an English lad ought surely to associate Newton with something more than the binomial theorem.

Again, the history of mathematics is of direct benefit to the teacher himself in more ways than one. The progress of scientific discovery rarely, if ever, proceeds along strictly logical lines; and of this fact mathematics affords a conspicuous example. The science took its rise from concrete problems of calculation and measurement: for a long time it remained partly empirical; and it is only in quite recent times that its axioms and postulates have been submitted to rigorous examination. The significance of this for the teacher lies in the fact that the intellectual growth of the race repeats itself to a large extent in the individual; thus in teaching the rudiments of algebra and geometry it is by far the best plan to begin with concrete problems and examples, avoiding abstract formulæ, and introducing the appropriate notation gradually, as the necessity arises.

Another wholesome result of this historical knowledge is the lesson of patience which it conveys. A teacher who is vexed and disappointed by the slowness of his class may console himself by reflecting upon the length of time which has been required by mature intellects to obtain a true conception of the nature of fractions, of negative, irrational, and complex quantities, and so on. The controversies to which these subjects gave rise, even among professed mathematicians, are very instructive in throwing light upon the psychological difficulties which every honest student of mathematics must encounter, and which the aid of a sympathetic teacher helps him to overcome.

From all these different points of view the teacher will find Prof. Cajori's book very helpful and suggestive. It is easy to read, without being superficial; it is composed with a due sense of proportion; and the limitation of its scope enables the author to enter into sufficient detail without making his work too large. Thus, for example, the account of early printed books on arithmetic and algebra is rendered extremely vivid by the insertion of numerous specimens of notation; this, more than anything else, enables the reader to appreciate not only the immense advantage of modern notation, but also the extraordinary power of men like Fermat and Tartaglia, who were able, in spite of most imperfect and inconvenient apparatus, to make discoveries of first-rate importance.

Although, perhaps, the sections devoted to the Middle Ages and the Renaissance are the most interesting and profitable, the early pages on number-systems and numerals, and on the Rhind papyrus, are likely to be the most novel to the general reader. For the mathematician it still remains to account for such resolutions as $\frac{2}{43} = \frac{1}{42} + \frac{1}{86} + \frac{1}{129} + \frac{1}{301}$, a list of which occurs in the papyrus referred to. It is difficult to see how they were obtained, or what practical purpose they were intended to serve; apparently the standard way of representing a fraction was to express it as the sum of aliquot parts with different denominators. It is not merely a question of aliquot parts. Ahnes and his contemporaries must surely have known that $\frac{2}{43} = \frac{1}{43} + \frac{1}{43}$, although even about this it may not be safe to dogmatise.

The most difficult part of a work of this kind is the discussion of modern developments. Thanks to a number of unselfish scholars, the stages of ancient and mediæval discovery have been traced out with great care and precision; and although much, no doubt, may still be done, the landmarks are familiar, and the data, after all, are limited. But a history of modern mathematics, beginning, say, with the present century, has yet to be written; and here the amount of material is so vast, and its ramifications so numerous, that to discuss it properly seems to require a trained band of specialists. In dealing with recent times, Prof. Cajori has wisely confined himself to a few points of special interest, such as the progress of trigonometry, the researches on the value and nature of π, the rise of projective geometry, and the discussion of the merits of Euclid's "Elements" as an elementary text-book. He is against the retention of Euclid, but confesses, at the same time, that in his opinion the ideal text-book has not yet appeared. He very properly protests against attempts to prove the postulate about parallels; and scores a fair hit by pointing out the inconsistency of the conservatives, who swear by Euclid and then ignore his fifth book.

The "Hints on Teaching," referred to in the title, consist of remarks suggested by the historical context, and do not form an integral part of the work. They are the observations of a practical teacher, and commend themselves by their reasonableness and common-sense. Thus, on the one hand, Prof. Cajori recommends that the concrete should precede the abstract, that proofs of the obvious should be avoided, and that in some cases logical rigour should be temporarily sacrificed; on the other, he insists on the necessity for intelligent teaching, such as will train the mind to independent thought and observation.

For the reader who wishes to pursue the subject further, there are a number of references. It may be suggested that it would be an improvement if the proportion of primary references were larger than it is. Thus, to take an example at random, on page 231 there is an account of Girard's discussion of imaginary roots of equations, and a footnote gives a reference to Cantor II. 718. This is all very well as an acknowledgment on the author's part, but the reader would prefer a reference to the page in Girard where the original passage is to be found. Secondary references of this kind involve waste of energy.

One point to which the author might well have drawn attention is the variety of projective properties of conics to be found in Apollonius. It is certain that Pascal read the "Conics"; and it is by no means unlikely that modern projective geometry springs from the study of the works of the great geometer of Perga.

A small but rather irritating matter is the inconsistency shown in the transcription of Arabic names. Why, for instance, should we have Al Battânî in two words and Albirûnî in one? And, again, why use the German transcription *dsch* when the English *j* or the international *ǵ* is ready to hand? Thus, on page 110, Abu Ǵa‘far al-H̤ázin appears as Abû Dscha ‘far Alchâzin, and our old friend ‘Omar Khayyám (‘Omar al-H̤ajjám) masquerades as ‘Omar Alchaijâmi. Let us have either a popular English approximation, or a scientific transliteration; a German popular version is simply hideous.

We may conclude with a word of praise for the biographical part of the work. So far as the limits of the book allow, the author tells us about the mathematicians of the past what rightly interests us to know, and what the spirits of the great departed would not resent our knowing. To retail the spiteful gossip that clings to the memory of Kepler or Cardan, and to linger over the details of the Newton-Leibnitz controversy, is not the mark of a generous mind, and is utterly unprofitable besides. We are glad that, in this respect, Prof. Cajori's book is above reproach. G. B. M.

HINDU MEDICINE.

A Short History of Aryan Medical Science. By H. H. Sir Bhagvat Sinh Jee, K.C.I.E., M.D., D.C.L., L.L.D., F.R.C.P.E., Thakore Saheb of Gondal. Pp. 280; with 10 plates. (London: Macmillan and Co., Ltd.)

THE author, an Indian prince, after studying medicine with diligence and distinction in this country, applied himself on his return to India to a study of the ancient medical science of Hindustan. As a result, he presents in this treatise a bird's-eye view of the marvellous civilisation of India, and he does so from the point of view of a Hindu, in a spirit of faith and optimism creditable to his piety and patriotism. Perhaps a larger exercise of the critical faculty might have been more acceptable to Western intelligence, especially as, in some matters of history and chronology, the author is at issue with European authorities; but it might also have spoiled the picture, which is simple and bright. The writer prefaces his account of Indian medical science by a brief sketch of the early civilisation of the Hindus and of their religion, philosophy, science and art. The science and art of medicine were an important feature in this great system, elaborated according to the same principles and by the same methods as other branches of knowledge, and therefore possessing the same merits and the same faults. "The Hindus believe," the author tells us, "that like all their other sciences, the science of medicine has been revealed to them."

The bible of medicine is the "Ayur Veda," whose authorship is attributed to no less a personage than Brahma. Subsequent commentators, chief among them Charaka and Sushruta, have reproduced and somewhat amplified this record. The author, with great insight and judgment, gives an interesting history and epitome of the doctrines and practices laid down in these works, of which he appends a list of 107. We observe that he has not included among these the "Navanitaka," an ancient Sanskrit medical manuscript found by Captain Bower at Kuchar, in Eastern Turkestan, in 1890, and which is believed to be older than the works of Charaka and Sushruta. The development of science by the wise men of the East was a mixture of observation and contemplation. Their observation was keen though somewhat crude, but when the results were submitted to the process of intellectual digestion, an excessive addiction to analysing and systematising produced a code of knowledge into which imagination largely entered, and which was specious and unsound. The product, possessing the character and sanction of a revelation, became straightway a fixed guide, which has remained authoritative and unaltered through the ages. The early medical observers scrutinised closely the structure and functions of the human body, and not content with noting and recording these, they must fully and finally explain them. For this purpose they invented three principles or essences or spirits—*vata*, *pitta*, and *kafa*—wind, bile, and phlegm, which, acting upon and through the constituent parts of the body, gave rise to all the manifold physiological manifestations of the organism. Disease was held to arise from excess, defect, or disorder of one or more of these humours, and the object of the physician in examining the patient, was to detect which humour or humours were at fault, and select the remedy calculated to restrain, stimulate, or correct the aberrant fluid. A doctrine of temperaments was built on the same basis. Associated with these hypothetical spirits, other supernatural agencies were postulated; faults committed in a former state of existence, and the operations of demons, were included among disease causes. It is not surprising, therefore, that rites, ceremonies, amulets, omens, and charms entered largely into treatment. The Thakore Saheb advances strong claims for the antiquity and excellence of Indian medicine. He contends that the medical science of the Greeks, Egyptians, and Arabians, was extensively borrowed from India. He asserts that Jenner and Pasteur were anticipated in the matter of protective inoculation, Morton and Simpson in anæsthesia, Lænnec in auscultation, Piorry in percussion, and Lister in antiseptics by Indian sages; that the vaunted discovery of Harvey was also presaged, if not preceded, by Indian doctrines regarding the circulation of the blood. He shows that modern medicine has derived important practices, such as massage, and many useful drugs, from India, and even goes the length, in apologising for the shortcomings of Indian surgery, of asserting that in ancient times the use of drugs prevented or dispersed tumours, and other conditions now demanding surgical intervention. He expounds at some length the rules of hygiene and disease prevention laid down by the *rishis*. They are mostly personal, and their elaboration is astonishing. Life to the orthodox Hindu was a series of minute rites governing every item of daily existence—some salutary, but most of them frivolous.

Still, with all its absurdities, Indian medicine was a triumph of acumen and industry, and the author has succeeded in placing a very clear and complete compendium of it on record in this book, which he who runs may read. Perhaps his hope that rational and progressive medical science may still be able to learn something from Aryan medical science is a feasible one; but the materials and methods of the latter must to that end be recast in the furnace of modern inductive research.

OUR BOOK SHELF.

On the Adjustment and Testing of Telescopic Objectives. By T. Cooke and Sons. Second edition. Pp. 96. (York: Delittle and Sons, 1896.)

THE first edition of this admirable little volume appeared in the year 1891, and since that time its fame has spread abroad, and both German and Italian translations have been made. In this short interval of time a very notable advance has been made in the construction